

# **Economic Integration and Portfolio Diversification: An Empirical Examination of ASEAN Markets**

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## **Abstract**

In this paper, we examine the potential gain achievable through international diversification using two different approaches to portfolio construction. We build portfolios in the Association of Southeast Asian Nations (ASEAN) stock markets for Japanese, German, and British investors respectively. Two sets of portfolios are constructed using two different approaches: a) Correlation based approach and b) Country Beta based approach proposed by Naidu and Choudhury (2006). Overall, our results show that Naidu-Choudhury approach (country-beta based) is a comparable alternative to Markowitz approach (correlation based) for all the three investors based on Sharpe's performance measure for the time period considered. Moreover, our results indicate that Naidu-Choudhury approach holds a promise as an alternative method to create internationally diversified portfolios.

## **I. Introduction and Background**

Trade agreements, bilateral and multilateral, among nations have been around for several decades. However, a new wave of Trade blocs began with the signing of North American Free Trade Agreement. The European nations started their efforts to create Single Market. Some Asian nations started laying ground work to form trade associations of their own. Association of Southeast Asian Nations (ASEAN) was formed in 1984 with 5 members. The membership grew over the next 15 years to ten. Meanwhile, a much broader Trade Association, Asia Pacific Economic Co-operation (APEC) was formed. APEC has 21 member nations with the U.S.A. as one of its members. The purpose of all these trade associations is to enhance the trade and investment flows among the member nations and thereby achieve regional prosperity, peace and stability. The functioning of these trade associations vary from a rigid rule -based system to a flexible/loose affiliation. APEC and ASEAN are the groups with flexible affiliations. This is in direct contrast with the North American Free Trade Agreement (NAFTA) or the European Union (EU).

Economic literature is full of studies revealing the benefits of trade blocs for its members as well as the outsiders of the bloc. The most recent study by Francois and Wignaraja (2008) is an example of such studies. In their study, Francois and Wignaraja tested global input-output structural model on data for ASEAN, ASEAN +3, ASEAN +3+India. While the ASEAN group is widely recognized regional trade bloc, the other two expanded groups include the potential new members for a much broader trade bloc. A trade bloc is no longer perceived as a trade "fortress". Instead, it is widely viewed as a way to unleash the economic synergies among nations. Simply put, it is one way to make the economic landscape flat. Accumulated evidence points to the fact that economic benefits accrue to the member nations without ill-effects on non-

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members of a trade bloc. As the trade bloc fosters economic prosperity and income growth for its members, savings accumulation and capital formation follow. This paves the way for capital markets development. The purpose of this paper is to examine the risk-return tradeoffs prevailing in the capital markets of member nations of ASEAN bloc. First, this paper examines the correlation structure of stock returns from the ASEAN group of countries. By examining the correlation structure, we can see if benefits of portfolio diversification accrue to investors in ASEAN region. Further, this paper applies a new method of constructing portfolios of investments within the trade bloc to show that investors may still improve their return performance by diversifying within the trade bloc. Market imperfections continue to persist even after trade bloc's formation. Political differences, institutional rigidities, differences in economic philosophy, and inefficiencies of capital markets are some of the reasons for the delay in achieving economic harmonization. True economic integration among the member nations takes a long time to develop. In the mean time investors can find opportunities to diversify their portfolios within the region that they are quite familiar and knowledgeable about.

The paper is organized as follows. Data and methodology are described in the next section. Descriptive statistics for stock market returns appear in Table 1. Correlation matrix of stock returns and country betas are presented in Table 2 and Table 3 respectively. Section III provides portfolio diversification scheme. Section IV presents Country beta estimates for several Asian countries in the study. This section also constructs portfolios using country betas as guide. After we constructed country-beta based portfolios, they were compared with the portfolios generated by Markowitz's portfolios as to their risk adjusted performance. Such a comparison helps us observe if country beta approach to build internationally diversified portfolios is comparable to the Markowitz's correlation-based method.

## **II. Research Methodologies**

Data for this study were obtained from Global Financial Data, Inc., Source OECD, IMF statistics, and Yahoo-Finance. The data covers the period, 1995-2007. ASEAN group has a list of 10 countries. Some of these countries such as Laos, Cambodia, Myanmar don't have stock exchanges. The potential for expansion of the trade group towards east may include Japan, Korea and China (ASEAN+3). Some are of the opinion that India may also be the member of the expanded group. So, we included these countries as well in our research. The daily data for all the stock market indices of the countries (ASEAN+3+India) in the region were obtained. Daily returns were computed and then the daily returns were annualized using standard method suggested in investment text books. Daily exchange rate changes were found to be random and therefore, exchange rate effect was not considered in estimation of daily stock returns. Furthermore, the research aim here is to discern portfolio diversification benefits. Effects of informational leads and lags on stock prices were not taken into account, since informational efficiency is not the primary intention of this paper. Descriptive statistics of equity return series appear in Table 1. Since, the correlation structure of returns has been one of the bases for judging the diversification (risk reduction) potential, we have estimated the correlation structure of annualized daily stock returns among the Asian equity markets and presented in Table 2. As pointed out in the next section of this paper, for certain markets the correlation structure does not give us adequate picture of diversification potential when global diversification is sought. Therefore, another approach as suggested by Shapiro (2003) and demonstrated by Naidu and Choudhury (2006) is also used in this study. The country beta approach has a greater potential

for global diversification of portfolios. Therefore, we estimated country betas for all the Asian stock markets in the sample by taking the Japanese investor’s perspective.

### III. Theoretical Setting

The idea that the smaller the degree of correlation the greater the benefit of diversification was popularized by Harry Markowitz (1959). This idea of risk reduction using the correlation structure of returns determines the extent of benefits derived through diversification. However, Sharpe’s theory of capital market equilibrium that introduced the concept of beta has a potential for diversification as well. The beta of an asset reflects the variability of its return relative to the variability of market’s return. Thus beta is a relative risk measure. An individual asset’s beta is calculated relative to a specific market index, such as S&P500.

All national equity markets together create the global capital market environment. Therefore, if we aggregate all the national equity markets we will have a huge world (global) equity market. Each national equity market has its own degree of volatility. However, the volatility relative to each other market will be different. In the same way an equity market’s volatility relative to an index of world equity market will be different. Just as one can estimate the risk (beta) of an asset relative to a market index, one can also estimate the risk (beta) of a national equity market relative to world equity market index. This risk estimate of a national equity market is termed as country beta. Thus, a country’s beta is the measure of its market’s sensitivity to world market variability. Bekaert and Harvey (1997) concluded that market volatility is a function of the openness of its economy. Therefore, a country’s beta is indicative of integrator. The smaller the beta, the more segmented is the country’s market and hence better will be the gains from diversification. Consequently, international diversification pushes out the efficient frontier further by allowing investors simultaneously to reduce their risk and increase their expected return. Similarly, we can also study the sensitivity of a given equity market to the movements of another equity market of our interest. For example, if we want to know how sensitive the Korean equity market is relative to the movements in Japanese equity market, we can examine this relationship by estimating country beta for Korea with respect to the Japanese equity market. Shapiro (2003) demonstrated this methodology in his book (p.517). A country’s market beta is estimated as follows:

$$\begin{aligned} \text{Market beta for country, } i \text{ with respect to Japan} \\ &= [\text{Correlation of market, } i \text{ with Japanese market}] \times \\ & \quad [\text{Std. Devn. of market, } i / \text{Std.Devn. of Japanese Market.}] \end{aligned}$$

$$\beta_i = \rho_{i,J} \left( \frac{\sigma_i}{\sigma_J} \right) \quad \text{where } \rho_{i,J} = \text{Correlation coefficient between } i^{\text{th}}$$

market returns and Japanese market returns

$\sigma_i$  = Standard deviation of  $i^{\text{th}}$  market returns

$\sigma_J$  = Standard deviation of Japanese market returns

A small beta value for a country implies a higher unsystematic risk in that market. Therefore, a smaller country beta offers greater potential for the benefits of diversification. On the contrary, a higher value for a country’s beta implies smaller potential for gains from diversification. Markowitz (1959) theorized that the smaller the degree of correlation the greater is the benefits of diversification. However, this theory looks too simple when it comes to global diversification.

In a global market, it is possible for a pair of countries to have the same degree of correlation with a third country and yet have different values for individual market risk. For example,

$$\begin{aligned} \rho_{J,US} &= 0.25 & \sigma_J &= 28.8\% & \beta_J &= 0.40 \\ \rho_{K,US} &= 0.25 & \sigma_K &= 35.5\% & \beta_K &= 0.50 \end{aligned}$$

In this example, the difference in individual standard deviations produced different country betas. That means even though Japan and Korea had the same degree of correlation (0.25) with the U. S. market, their country betas imply that Japanese market offers better gains from diversification than the Korean market does. This example demonstrates that gains from diversification can be estimated better by using country betas rather than the simple correlation coefficients.

By generalizing this theory we can develop the following equation:

$$\begin{aligned} \text{Market beta for country } i \text{ with respect to World Market} \\ &= [\text{Correlation of market, } i \text{ with World Market}] \times \\ & \quad [\text{Std.Devn. of market, } i / \text{Std.Devn. of World Market.}] \end{aligned}$$

$$\beta_i = \rho_{i,w} \left( \frac{\sigma_i}{\sigma_w} \right) \quad \text{where } \rho_{i,w} = \text{Correlation coefficient between } i^{\text{th}}$$

market returns and World Market returns

$\sigma_i$  = Standard deviation of  $i^{\text{th}}$  market returns

$\sigma_w$  = Standard deviation of World Market returns

#### IV. Portfolio Diversification and Performance Index

One way to estimate the benefits of portfolio diversification is to consider the expected return and standard deviation of return for a portfolio consisting of a fraction invested in the host country and the remaining fraction invested in several other countries (or markets).

The expected return of a portfolio is calculated as,

$$\mu_p = W' \mu$$

and the variance of the portfolio is calculated as,

$$V_p = W' \Sigma W$$

where,  $W$  is the vector of portfolio weights (or percentages) for different markets,  $\mu$  is the mean vector of returns of markets in the portfolio, and  $\Sigma$  is the variance-covariance matrix. For example, the mean and variance of a portfolio with only two markets (assets) can be written as,

$$\begin{aligned} V_p &= w_1^2 \sigma_1^2 + w_2^2 \sigma_2^2 + 2 w_1 w_2 \sigma_{12} \sigma_1 \sigma_2 \quad . \\ \mu_p &= w_1 \mu_1 + w_2 \mu_2 \end{aligned}$$

Where,  $\mu_1$  = average return of market-1,  $\mu_2$  = average return of market-2,  $\sigma_1$  = standard deviation of return of market-1,  $\sigma_2$  = standard deviation of return of market-2,  $\sigma_1 \sigma_2$  = covariance of returns between market-1 and market-2.

To evaluate the performance of a portfolio, both return and risk should be incorporated into the performance measure. William Sharpe (1966) developed a composite (risk-adjusted)

measure of portfolio performance called the reward-to-variability ratio (RVAR). This measure is also known as Sharpe's Performance Index (PI), which can be defined as,

$$PI_p = \frac{\mu_p - r}{\sigma_p}$$

Where,  $\sigma_p$  = standard deviation of p<sup>th</sup> portfolio return,  $\mu_p$  = average return of p<sup>th</sup> portfolio, r = risk-free rate for this period. Therefore, the higher the values of the index better the performance of that portfolio on risk-adjusted basis.

The coefficient of variation (CV), which measures relative variability, can also be used to measure the standardized risk with respect to the mean and can be considered as risk-reward ratio of a portfolio's performance. Coefficient of variation of a portfolio is defined as,

$$CV_p = \frac{\sigma_p}{\mu_p} \times 100$$

Therefore, the smaller the CV the better is the performance of that portfolio. Thus, a portfolio is considered to be more diversified if the CV is smaller in value and may be a better measure for diversification, since the coefficient of variation is independent of the unit of measurement. Coefficient of variation is essentially a mirror reflection of Sharpe's Index. Hence, an investor's objective is to construct a portfolio with a relatively lower coefficient of variation or higher Sharpe's Index.

## V. Diversification Scheme

In this paper, we have constructed portfolios for the purpose of diversification in the ASEAN stock markets for Japanese, German, and British investors respectively. First, we identify the opportunity for portfolio diversification using country beta as the criterion instead of the correlation coefficient for selecting the country to invest. For example, a Japanese investor may look at the remaining nine countries stock markets and select the country with the smallest beta to invest first. The country with the next highest beta could be the second investment to add to the portfolio. Following this process the investor will allocate funds to the markets in an ascending order of the country's beta value --- the smallest beta country will be the first chosen and the highest beta country will be chosen the last. In the process of portfolio allocation, some basic rules are arbitrarily set. First, an equal allocation to each single foreign market is set at 10% of the total funds. Second, the size of the portfolio is arbitrarily set to include only four assets. So a Japanese investor will have 70% of the funds invested in Japan stock market and 30% outside of Japan. Following this procedure, the Japanese investor will have three portfolios (four-assets each) as shown in Exhibit-2. Similarly, three portfolios are constructed for the German investor and three for the British investor. In total, we have nine portfolios constructed. The risk-return characteristics of these portfolios are estimated for the period, 1995-2007. We hope to demonstrate that country beta based approach to portfolio diversification offers a new way to build globally diversified portfolios. We have built similar portfolios using correlation coefficient (Markowitz approach) as a selection criterion (see, Exhibit-1) for the purpose of comparison.

## VII. Empirical Results

The data in this study covers the period, 1995-2007. The daily data for all the stock market indices of the countries considered in this paper were obtained. Daily returns were computed and then the daily returns were annualized. Since, the correlation structure of returns has been one of the bases for judging the diversification (risk reduction) potential. We have

estimated the correlation structure of annualized daily stock returns among the equity markets and presented in Table I, along with mean and standard deviation. As mentioned earlier in the paper, for certain markets the correlation structure does not give us adequate picture of diversification potential when global diversification is sought. In this context Naidu and Choudhury (2006)'s country beta approach may be desirable for global diversification. Therefore, we implemented their country beta approach in this study for all ASEAN stock markets by taking three different investors' perspectives. First, a set of betas was estimated by taking the Japanese market's perspective. Then a second set of betas were estimated from the German perspective. We, then, estimated a third set of country betas from the British perspective. These country betas are reported in Table III.

The beta estimates that are used in this paper to construct portfolios are explained and discussed in great detail by Naidu and Choudhury (2006). As described earlier in the methodology section, a set of nine portfolios are created using Markowitz approach. This set of portfolios appears in Exhibit 1. Similarly, we have created another set of nine portfolios using country beta as the basis of selection using Naidu-Choudhury approach. This second set of portfolios is presented in Exhibit 2. As can be seen from these two exhibits, the least correlated country (asset) portfolio (in exhibit 1) and the lowest-beta portfolio (in exhibit 2) are exactly identical in composition. Therefore, the country composition of first portfolio is exactly same irrespective of the underlying creation approach differences. Furthermore, the first portfolio constructed at the lowest risk level is same in composition regardless of the investors' home market. The portfolio composition changes, however, as the correlation and the beta levels ascend. For example, the portfolio-2 for Japanese investor in Exhibit 1 and that in Exhibit 2 have a slightly different composition. The portfolio-3 for German and British investors in Exhibit 1 and that in Exhibit 2 have little more divergence in composition. Thus, at the second or third level of screening, using correlation as selection basis produced a portfolio that is different in composition than that produced by the country beta as the selection criterion.

Mean, standard deviation, coefficient of variation (CV), and Sharpe's Index for all nine portfolios constructed using the correlation-based (Markowitz) screening criterion is presented in Table IV and the results are somewhat disappointing. Sharpe's Index values are all negative implying that all the nine portfolios constructed using Markowitz approach underperformed the risk-free assets (short-term government debt) in their respective home markets. The degree of underperformance varied greatly among the nine portfolios. The first set of portfolios delivered a better risk-adjusted performance than the other sets as measured by coefficient of variation. In other words, the markets in China, and Vietnam consistently offered the best diversification potential for the Japanese, German, and British investors alike. These investors would have been better off; however, had they invested in the short-term government debt instruments (risk-free assets). A plausible explanation is in order. It appears that the markets for risky assets did not adequately compensate the risk takers. Stock markets suffered two major crises (Asian financial crisis/contagion and the dot.com bubble burst) during this study period. Risk premiums were not adequate for the levels of risk the investors took during this time period.

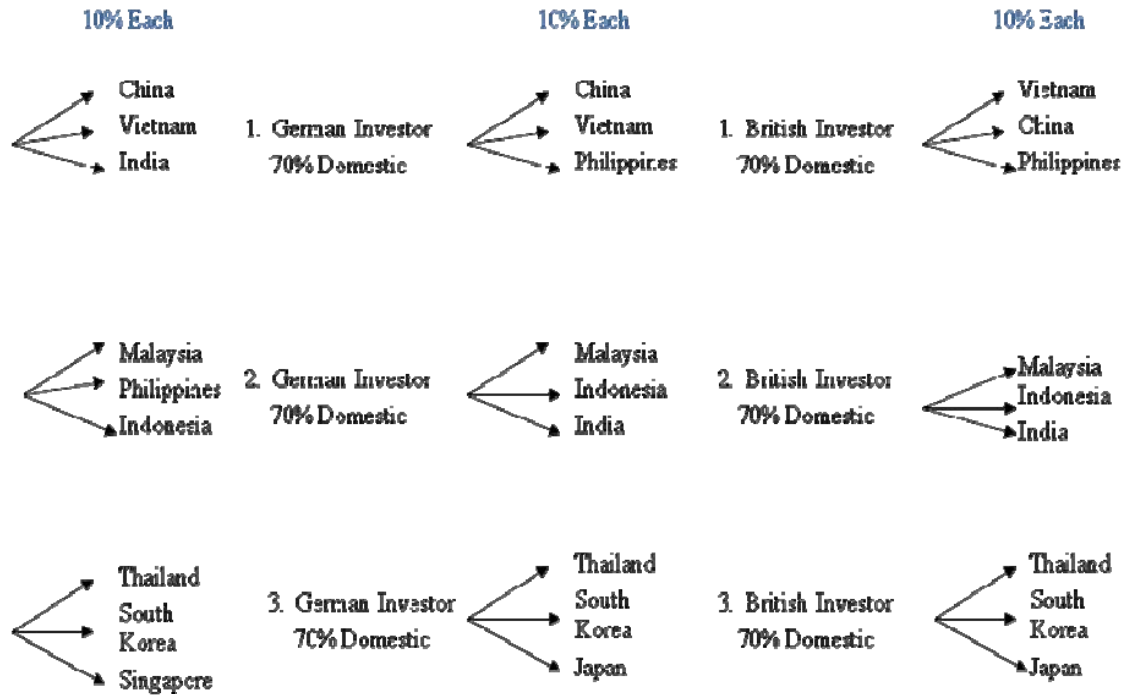
Table V displays the mean, standard deviation, coefficient of variation (CV), and Sharpe's Index for all nine portfolios constructed using the country beta as the basis for screening. These portfolios constructed using country beta approach also produced negative

values of Sharpe's Index of similar kind. In other words, the country beta based method of constructing portfolios did not produce any superior performance compared to Markowitz method. However, this provides investors an alternative tool to construct diversified portfolios across international markets and may produce different (perhaps favorable) results at different trade bloc in different time periods.

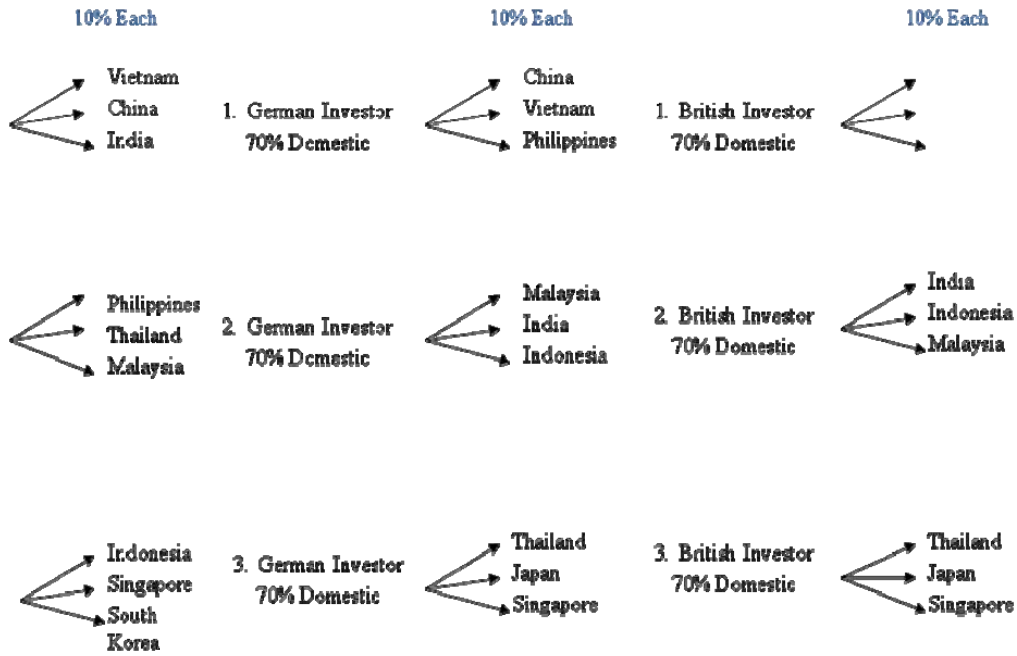
## **V. Conclusion**

In a world of less integrated capital markets, international portfolio diversification is advocated to earn higher returns with lower risk. Markowitz approach to domestic diversification was extended to global diversification by Levy and Sarnat (1970) and Solnik (1974) and many others followed afterwards. However, not much attention has been given toward the investigation of relative risk measure (beta) for potential diversification gain in international arena. This paper implements a method of portfolio construction on the basis of country beta criterion proposed by Naidu and Choudhury (2006). In this paper, portfolios are constructed using both Naidu-Choudhury (beta) approach and Markowitz (correlation) approach for three different markets (Japan, Germany, and Britain). Then the performance of these portfolios has been measured using both Coefficient of Variation and Sharpe's Index. The analysis reveals that Naidu-Choudhury approach produces portfolios comparable to those produced by Markowitz approach. Another interesting finding is that, although the two different approaches produce portfolios with slightly different composition of markets, but the composition of markets stay same for the best diversified portfolio for each of the home markets considered in this paper. In other words, Naidu-Choudhury method and Markowitz method produced essentially same optimal portfolio.

### Exhibit-1 [Correlation Based]



**Exhibit-2 [Beta Based]**



**TABLE I**  
**Correlations, Means, and Standard Deviations of Annualized Daily Stock Market Returns (1995-2007)**

Country	Japan (Correlations)	Germany (Correlations)	England (Correlations)	N	Mean	Std Dev
<b>China</b>	0.031	-0.015	-0.013	3152	2.964	30.630
<b>India</b>	0.179	0.126	0.176	3206	2.134	19.502
<b>Indonesia</b>	0.209	0.125	0.145	3197	2.478	24.252
<b>Japan</b>	1	0.223	0.262	3203	1.099	17.242
<b>Malaysia</b>	0.190	0.093	0.142	3206	1.731	25.751
<b>Philippines</b>	0.194	0.085	0.116	3221	1.510	20.790
<b>Singapore</b>	0.370	0.271	0.320	3258	1.071	14.686
<b>South Korea</b>	0.368	0.193	0.246	2580	3.244	27.372
<b>Thailand</b>	0.213	0.157	0.187	3188	1.662	22.656
<b>Vietnam</b>	0.036	-0.008	-0.042	1629	2.893	21.718
<b>USA</b>	0.098	0.507	0.433	3273	1.119	13.056
<b>England</b>	0.262	0.722	1	3290	0.849	11.707
<b>France</b>	0.242	0.790	0.812	3293	1.490	16.496
<b>Germany</b>	0.223	1	0.722	3327	1.682	17.902

**TABLE II****Correlations Matrix of Annualized Daily Stock Market Returns (1995-2007)**

Country	China	India	Indonesia	Japan	Malaysia	Philippines	Singapore	South Korea	Thailand	Vietnam	USA	England	France	Germany
<b>China</b>	1.000	0.047	0.021	0.031	0.023	0.014	0.044	0.029	0.023	0.015	-0.032	-0.014	-0.018	-0.016
<b>India</b>	0.047	1.000	0.195	0.179	0.103	0.114	0.249	0.239	0.175	-0.013	0.043	0.176	0.159	0.126
<b>Indonesia</b>	0.021	0.195	1.000	0.209	0.222	0.315	0.450	0.192	0.385	0.018	0.023	0.145	0.114	0.125
<b>Japan</b>	0.031	0.179	0.209	1.000	0.190	0.195	0.370	0.368	0.213	0.037	0.098	0.263	0.242	0.223
<b>Malaysia</b>	0.023	0.103	0.222	0.190	1.000	0.152	0.339	0.180	0.266	0.016	0.001	0.142	0.087	0.094
<b>Philippines</b>	0.014	0.114	0.315	0.195	0.152	1.000	0.308	0.203	0.274	0.037	0.030	0.116	0.073	0.085
<b>Singapore</b>	0.044	0.249	0.450	0.370	0.339	0.308	1.000	0.367	0.444	0.008	0.124	0.320	0.281	0.271
<b>South Korea</b>	0.029	0.239	0.192	0.368	0.180	0.203	0.367	1.000	0.322	0.024	0.090	0.246	0.213	0.193
<b>Thailand</b>	0.023	0.175	0.385	0.213	0.266	0.274	0.444	0.322	1.000	-0.013	0.050	0.187	0.155	0.157
<b>Vietnam</b>	0.015	-0.013	0.018	0.037	0.016	0.037	0.008	0.024	-0.013	1.000	-0.036	-0.042	-0.021	-0.009
<b>USA</b>	-0.032	0.043	0.023	0.098	0.001	0.030	0.124	0.090	0.050	-0.036	1.000	0.434	0.459	0.508
<b>England</b>	-0.014	0.176	0.145	0.263	0.142	0.116	0.320	0.246	0.187	-0.042	0.434	1.000	0.813	0.723
<b>France</b>	-0.018	0.159	0.114	0.242	0.087	0.073	0.281	0.213	0.155	-0.021	0.459	0.813	1.000	0.790
<b>Germany</b>	-0.016	0.126	0.125	0.223	0.094	0.085	0.271	0.193	0.157	-0.009	0.508	0.723	0.790	1.000

**TABLE III****Country Betas of Annualized Daily Stock Market Returns (1995-2007)**

<b>Country</b>	<b>Japan</b>	<b>Germany</b>	<b>England</b>
<b>China</b>	0.056	-0.026	-0.035
<b>India</b>	0.203	0.137	0.293
<b>Indonesia</b>	0.294	0.169	0.300
<b>Japan</b>	1	0.215	0.386
<b>Malaysia</b>	0.284	0.135	0.313
<b>Philippines</b>	0.234	0.099	0.206
<b>Singapore</b>	0.315	0.222	0.401
<b>South Korea</b>	0.584	0.295	0.575
<b>Thailand</b>	0.279	0.1987	0.362
<b>Vietnam</b>	0.045	-0.011	-0.077
<b>USA</b>	0.074	0.370	0.483
<b>England</b>	0.178	0.472	1
<b>France</b>	0.231	0.728	1.145
<b>Germany</b>	0.232	1	1.105

**TABLE – IV**  
**Portfolios created using country correlations in ascending order.**

Portfolios	MEAN	Standard Deviation	Coefficient of Variation (CV) %	Sharpe's Index	Portfolio of four countries and their % allocation			
Japanese Investor -1	1.56858	13.29047	847.2923	-0.18746	Japan-70%	China -10%	Vietnam-10%	India-10%
Japanese Investor -2	1.34139	14.27915	1064.503	-0.19039	Japan -70%	Malaysia -10%	Philippines-10%	Indonesia-10%
Japanese Investor -3	1.36724	14.8283	1084.537	-0.1816	Japan -70%	Thailand -10%	South Korea-10%	Singapore -10%
German Investor -1	1.91486	13.37034	698.2412	-0.16044	German-70%	China -10%	Vietnam -10%	Philippines -10%
German Investor -2	1.81242	14.09285	777.5688	-0.15948	German-70%	Malaysia -10%	Indonesia -10%	India -10%
German Investor -3	1.77873	14.65789	824.0652	-0.15563	German-70%	Thailand -10%	South Korea -10%	Japan -10%
British Investor -1	1.33115	9.373297	704.1479	-0.29113	British-70%	Vietnam -10%	China -10%	Philippines -10%
British Investor -2	1.22871	10.30713	838.8517	-0.27469	British-70%	Malaysia -10%	Indonesia 10%	India -10%
British Investor -3	1.19502	10.8791	910.367	-0.26335	British-70%	Thailand -10%	South Korea -10%	Japan -10%

**Note:** Coefficient of Variation (CV) = (Standard Deviation / Mean) x 100.  
 Sharpe's Performance Index (PI) = (average return – risk-free rate) / standard deviation of returns.

**TABLE – V**  
**Portfolios created using country betas in ascending order.**

Portfolios	MEAN	Standard Deviation	Coefficient of Variation (CV) %	Sharpe's Index	Portfolio of four countries and their % allocation			
Japanese Investor -1	1.56858	13.29047	847.2923	-0.18746	Japan-70%	Vietnam -10%	China -10%	India-10%
Japanese Investor -2	1.25987	14.2305	1129.519	-0.19677	Japan -70%	Philippines -10%	Thailand -10%	Malaysia -10%
Japanese Investor -3	1.44876	14.842	1024.459	-0.17594	Japan -70%	Indonesia -10%	Singapore -10%	South Korea -10%
German Investor -1	1.91486	13.37034	698.2412	-0.16044	German-70%	China -10%	Vietnam -10%	Philippines -10%
German Investor -2	1.81242	14.09285	777.5688	-0.15948	German-70%	Malaysia -10%	India -10%	Indonesia -10%
German Investor -3	1.56133	14.22377	910.9984	-0.17567	German-70%	Thailand -10%	Japan -10%	Singapore -10%
British Investor -1	1.33115	9.373297	704.1479	-0.29113	British-70%	Vietnam -10%	China -10%	Philippines -10%
British Investor -2	1.22871	10.30713	838.8517	-0.27469	British-70%	India -10%	Indonesia 10%	Malaysia -10%
British Investor -3	0.97763	10.29434	1052.986	-0.29942	British-70%	Thailand -10%	Japan -10%	Singapore -10%

**Note:** Coefficient of Variation (CV) = (Standard Deviation / Mean) x 100.

Sharpe's Performance Index (PI) = (average return – risk-free rate) / standard deviation of returns.

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